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The second part of the book is devoted to descriptions of special diseases. These are classified according to the nature of the crops on which they occur, as follows: Timber and shade trees; Field and forage crops; Garden crops; Orchards and vineyards; Greenhouse and ornamental plants; Wild plants. Under those heads the groups of fungi, as rusts, smuts, mildews, etc., are kept together.—H. HASSELBRING.

Regeneration.

WITH THE TITLE *Studies in regeneration* NĚMEC[3] has published in rather voluminous form the results of his investigations on the regeneration of root-tips. The general conclusions may be briefly summarized as follows. Cutting a transverse section just at the tip results in the regeneration of a new tip in a radial manner. The dermatogen and outer part of the periblem takes no part in this, the new tissue arising from the inner part of the cortex and the plerome. There is first of all the formation of a callus of hypertrophied cells, between which and the meristem arises the group of initials by which the new root-tip is organized. This group is radial from the beginning, the majority of its cells arising from the plerome, only the peripheral ones coming from the periblem. Proceeding back from the tip, the capacity for regeneration diminishes from the periphery inwards, soon disappearing from the periblem. As long as the central cells of the plerome still possess this capacity the regeneration is radial. Farther back it is confined to the pericambium and cells of the periblem and plerome immediately adjoining, which give rise to a ring of meristem, out of which usually more than one root-tip arises. When the capacity of the inner cells of the periblem and the outer cells of the plerome to take part in regeneration is lost, the replacement of the removed root-tip occurs only through the origin of lateral roots, which arise in the pericambium.

When the root is cut through obliquely, the regeneration of the new root-tip occurs at the part of the cut surface nearest the tip. When the tip is slit lengthwise each half re-forms a new tip. If a tip is slit lengthwise for about 1^{mm}, and then one of the halves is removed by a transverse incision, the remaining half regenerates a new half, and also, at the surface formed by the transverse cut, a new tip is developed. Lateral incisions to produce new roots must go at least half way through the plerome. Unless such an incision is made just back of the tip a new tip is soon organized immediately above the cut. The original tip is pushed to one side and finally is displaced entirely. When the incisions are made on two opposite sides of the root at different levels, new root primordia arise at each place, but only the one nearest the original tip continues to develop. If two incisions are made, on opposite sides and at the same level, a new root arises at each, but one is soon suppressed, while the other develops and finally replaces the original tip. About forty-eight hours after the wounding, starch usually appears in the cells of the periblem just above the cut. The grains are not yet mobile, and are aggregated about the nucleus. In about twenty-four hours more, however, they become statoliths and fall to the bottom of the cells. During this time the original tip has been losing its starch, and there is a period of from forty-eight to seventy-two hours in which the old tip has lost its starch and the new tip has none in a movable form. During this period the roots are ageotropic.

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[3] NĚMEC, B., Studien über die Regeneration. Imp. 8vo. pp. 387. *figs. 180.* Berlin: Gebrüder Borntraeger. 1905. *M* 9.50.

In ferns the root-tips do not regenerate. Tips cut off transversely just back of the apical cell are unable to organize a new one, though they may continue growing for several weeks. As the statolithic starch is in the root-cap, and this does not regenerate, such roots remain ageotropic.

Besides the discussion of the experiments, a number of chapters are devoted to a discussion of such topics as the influence of external conditions on regeneration, polarity and regeneration, growth and regeneration, purposefulness of regeneration, relation between geotropism and the presence of statocytes, and other interesting topics connected with regeneration.

As the root-tip regenerates from so many kinds of injuries that could never occur in nature Němec considers that at least in the great majority of cases the capacity could not have arisen because of its utility. The immediate stimulus, he thinks, does not lie among nutritive changes, or arise from the wound, but is a phenomenon of correlation, due to the breaking of the connection between the vegetative tip and the root meristem.—W. B. McCALLUM.

Plant histology.

CHAMBERLAIN has revised and rewritten much of his *Methods in plant histology*,[4] adding several new chapters, elaborating and in many instances shortening the processes. Several new formulae are given for killing and fixing. The paraffin method has been notably improved and the celloidin method has been treated at greater length. A method for embedding in soap is also given.

The new chapters deal with microchemical tests, free-hand sectioning, special methods, the use of the microscope, and micrometric methods involving the use of the camera lucida. A very important new chapter deals with methods of staining filamentous algae and fungi and mounting them in Venetian turpentine. An abstract of the methods of PFEIFFER and WELLHEIM is given, together with such modifications as have been found to give successful preparations. Delicate forms like Vaucheria can be carried through the stains and finally mounted in Venetian turpentine without showing the least trace of plasmolysis, and even if slight plasmolysis should occur it can be corrected by manipulation of the mounting medium. Preparations made by this method are exceedingly brilliant and show a wealth of detail not possible with other methods. For example, the two nuclei in zygospores of Spirogyra can be readily seen with a low magnification. The Venetian turpentine method, which gives preparations requiring no sealing and as hard and durable as balsam mounts, should almost entirely replace the glycerin method.

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[4] CHAMBERLAIN, CHARLES J., Methods in plant histology. pp. x+262. *figs. 88.* Chicago: The University of Chicago Press. 1905. Net $2.25; postpaid, $2.39.